ESS 200 (Stapleton)
Climate – Coriolis Effect

Name: A 7/8

Part I: Background Skills and Information

1. a) In the space to the right, draw a curved arrow tracing out a clockwise circle.

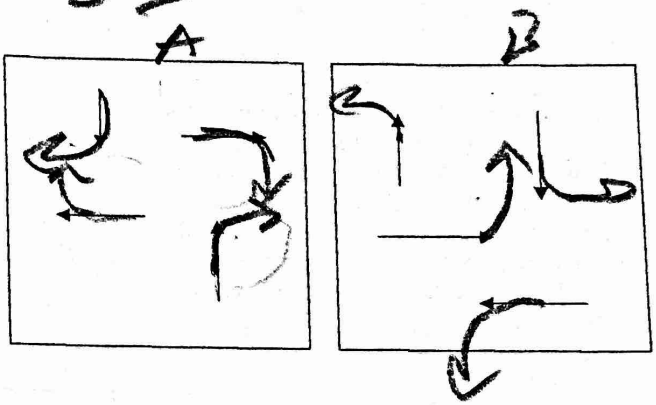
   b) Draw another curved arrow making a counter-clockwise circle.

2. Now imagine that the arrows above are the paths of cars. Which sort of rotation (CW or CCW) is the same as a continuous right turn?

same

3. Add a new segment to the front of each arrow in Box A, so that all of the arrows are curving clockwise.

   Are these arrows making right turns, left turns, or both?



4. Add a new segment to the front of each arrow in Box B, so that all of the arrows are arrows making counter-clockwise turns.

5. Does the Earth rotate toward the East or toward the West? [Hint: think about how the sun *appears* to move through the sky. Where does it rise and set?]

6. If you could look down on the Earth from above the North Pole, which way would it appear to rotate? (CW or CCW?)

7. Which part of the Earth is moving the fastest due to the Earth's rotation? What part is moving the slowest? [Hint: think of the earth as a merry-go-round]

Poles

Equator

Part II: Experiencing The Coriolis Effect

8. If you hold one arm straight out in front of you and turn around, you're sort of like the earth. The fastest part of your body is your _____ (head or outstretched hand), and the slowest part of your body is your _____ (head or outstretched hand). If you hold a paper wad by your face and then toss it at your hand, it's like throwing the paper from one of the Earth's _____ toward the Earth's equator.

9. Now simulate a missile launch in the Northern Hemisphere. Wad up a piece of paper to serve as a missile. Get your body spinning with your hand outstretched. Do this so that your head represents the North Pole and your hand represents the equator. In order to do this right, you will have to be spinning _____ (CW or CCW) when viewed from above. Another way to say this is that you will need to spin to your _____ (left or right).

   Hold the paper wad near your eye, as if you're throwing a dart at a dart board. Tilt up your outstretched hand to make it a target. Begin spinning. While you're spinning – WITHOUT STOPPING, and without taking your eyes off of your hand – toss the paper wad at your hand. The apparent curving that you see is called the Coriolis Effect.

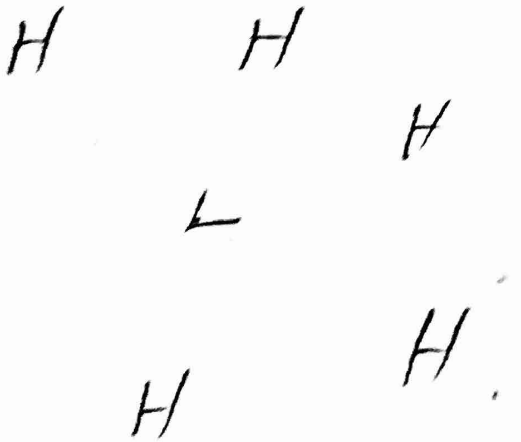
10. According to your simulation, which way do objects appear to curve in the Northern Hemisphere, due to the Coriolis Effect? Circle the two correct answers. CW CCW Right Left

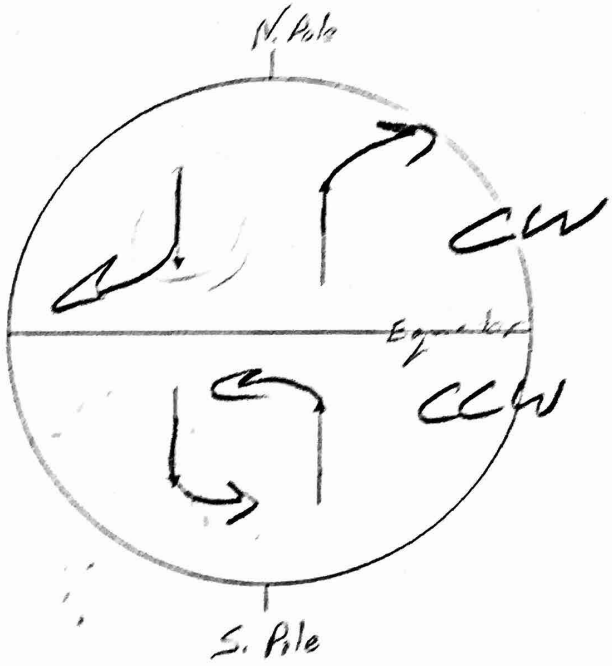
11. a) Does the paper wad really curve? No

b) What really happens? the I move under it.

12. Now do the same thing, but simulate a missile launch from the south pole toward the equator. To do this, you'll have to spin the other way. Which way do flying objects appear to curve in the Southern Hemisphere? CCW, Leftward

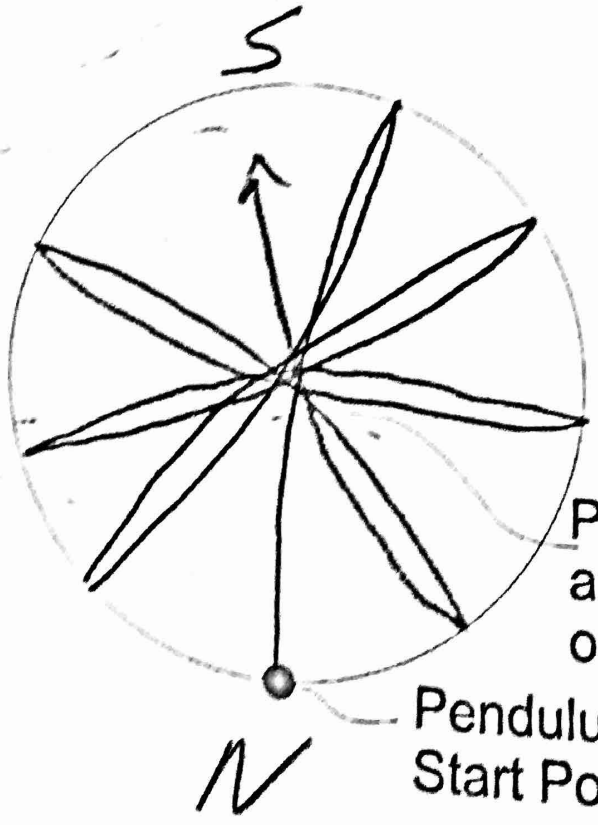
13. The arrows on the right represent missiles that have been fired in the directions shown below. Add a new segment on to each of the arrows to show how the apparent paths of the missiles will curve. Check the previous page to see which way flying objects should curve in each hemisphere.





The "Foucault Pendulum" is a device named after Jean Foucault. It swings back and forth on a long cable. The diagram to the right shows a "bird's eye" view of a circular room. The pendulum is suspended from the ceiling at the center of the room.

The pendulum will not return to its starting position. Show how, in the northern hemisphere, the pendulum's position changes over the course of the day.

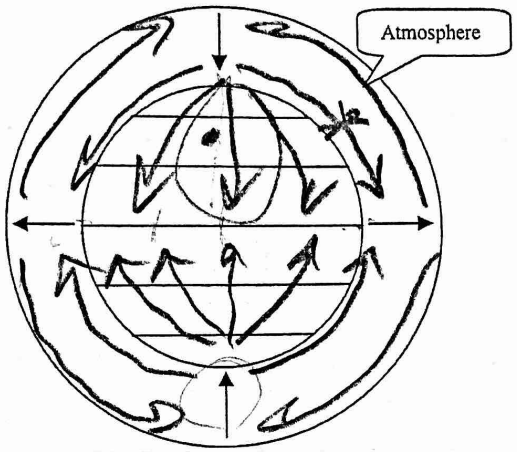


ESS 200 (Skyhelm)

Name: _____

Pressure and Temperature Applications:
Prevailing Winds and Climate Patterns

1. The diagram on the right shows the earth and the atmosphere surrounding the earth. In the diagram, air is rising at the equator and sinking at the poles. [The atmosphere is not drawn to scale.]



a. Why does air rise at the equator and sink at the poles?

Hot — cold

b. The rising and sinking air currents will create a pattern of circulating air. Draw that pattern in the donut shape of the atmosphere.

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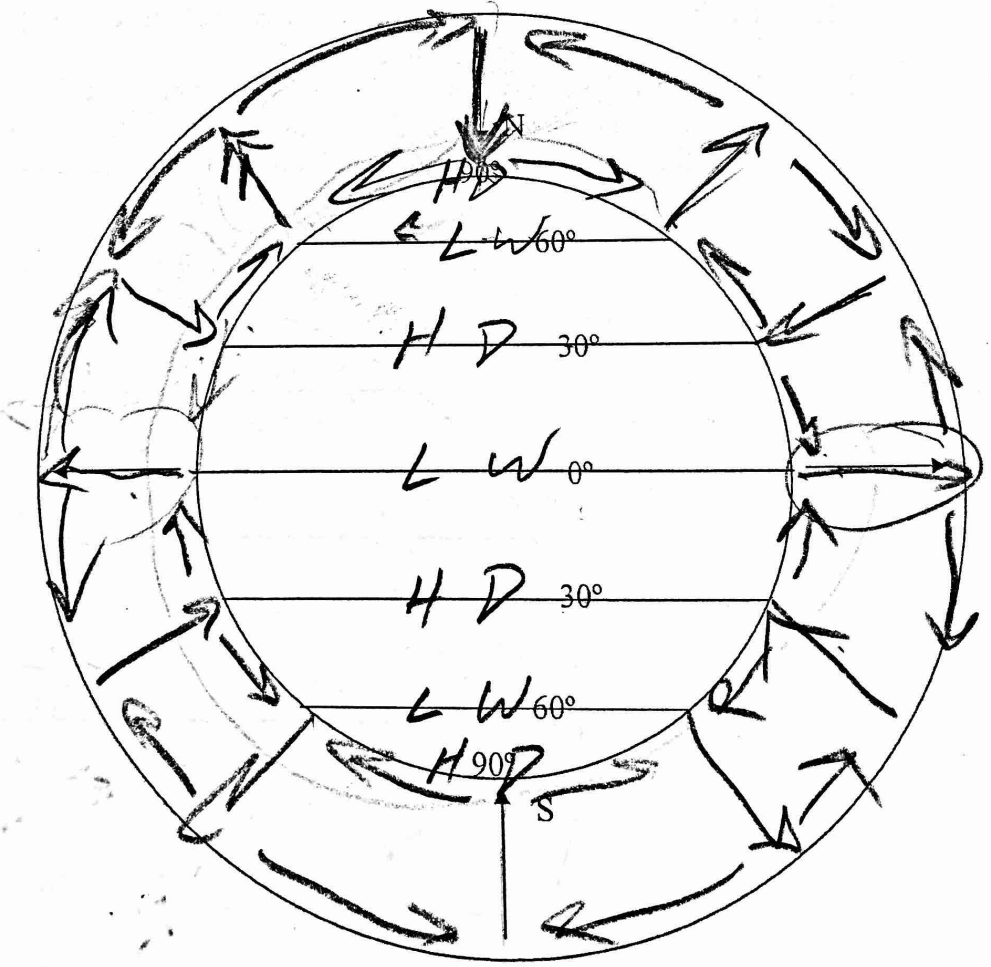
2. In reality, winds cannot travel all of the way to the equator from the poles, because the Coriolis Effect causes them to turn before they get there. In order to replace the rising and sinking air at the equator and the poles, air also sinks at 30° and rises at 60°. Draw the complete circulation pattern that results when you add-in these rising and sinking air currents.



3. This rising and sinking air creates areas of high and low pressure. Who do you think would feel high pressure, someone standing beneath rising air or someone standing beneath sinking air?

4. Sinking air = _____ (high pressure or low pressure) = _____ (clear skies or cloudy skies)
5. Rising air = _____ (high pressure or low pressure) = _____ (clear skies or cloudy skies)

6. *On the map above, each latitude with either an "L" (low pressure) or an "H" (high pressure).*
7. *Label the lines of latitude "wet" or "dry."*

8. You can see why some of the Earth's major rainforests lie on the equator. What are some of their names?

9. You can also see why some of the Earth's major deserts lie at 30° latitude. What are some of their names?

10. Does air move from high pressure to low or from low pressure to high? [Hint: think of poking a hole in a car tire.] H → L

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11. On the diagram below, label each latitude with the correct pressure (H or L). These areas are known as the earth's "Pressure Belts."
12. Now draw the winds that are created by these pressure differences. The winds will be created *between* the pressure belts. The Coriolis Effect actually makes these winds curve, but for now just draw the winds as straight lines pointing from high pressure to low pressure.